

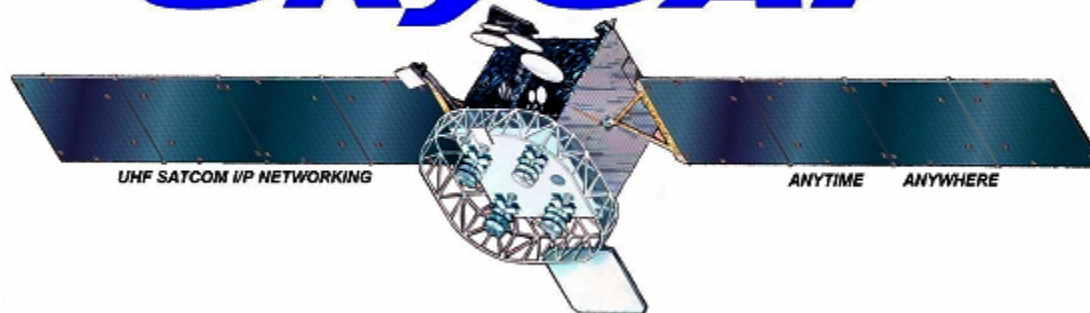


# Program Executive Office C4I and Space

## Global Command and Control System – Maritime (GCCS-M) Segments

### And SkyCAP Assured IP Software

***SkyCAP***



UHF SATCOM IIP NETWORKING

ANYTIME ANYWHERE

Alfred Mitchell  
SAIC  
Senior Systems Engineer

10<sup>th</sup> ICCRTS  
13 June 2005

Charles Gooding  
PMW-170-CG  
UHF Systems APM

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE <b>13 JUN 2005</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-2005 to 00-00-2005</b>	
4. TITLE AND SUBTITLE <b>Global Command and Control System - Maritime (GCCS-M) Segments and SkyCAP Assured IP Software (Briefing Charts)</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Program Executive Office,C4I &amp; Space PMW-179-CG,4301 Pacific Highway,San Diego ,CA,92101</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>The original document contains color images.</b>					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES <b>23</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			



## *What is SkyCAP?*

SkyCAP is a software solution to provide netted I/P access over half duplex LDR satellite (also LOS) links. It is the integration of the proposed MIL-STD-188-184A with an I/P interface. The original goal was to only pass TCP for mail, web browsing, ftp, etc. but has since been expanded to support all I/P types. SkyCAP has demonstrated use on other tactical Line-of-Sight (LOS) VHF/UHF radio networks and shows potential for Over-the-Horizon (OTH) HF radio modes.

**DOD does not have a UHF SATCOM I/P network waveform.**



# *What Is SkyCAP?*

- **SkyCAP is a TDMA implementation of MIL-STD-188-184. It includes proxy-tunnel component allowing for efficient IP networking and latency tolerance. The TDMA protocol provides shared use of the satellite channel in both netted and point-to-point modes.**
- **A little on 184:**
  - *It is a RED side CSMA data link protocol designed for UHF SATCOM.*
  - *MIL-STD-188-184 defines an interoperable waveform standard for data controllers required to operate over single-access, 5- and 25-kHz ultra high frequency (UHF) satellite communications (SATCOM) channels.*
  - *It is designed to reliably control the flow of data over noisy communications channels at high throughput rates and with minimum setup required for interoperability and performance.*
- **SkyCAP is a modification of this MIL-STD prepared to comply with Joint Staff direction requiring that a new standard for data control be developed.**
- **This MIL-STD defines the mandatory system parameters for planning, engineering, procuring, and using data control functions that will be used to transfer error-free data over UHF SATCOM channels during joint operations.**



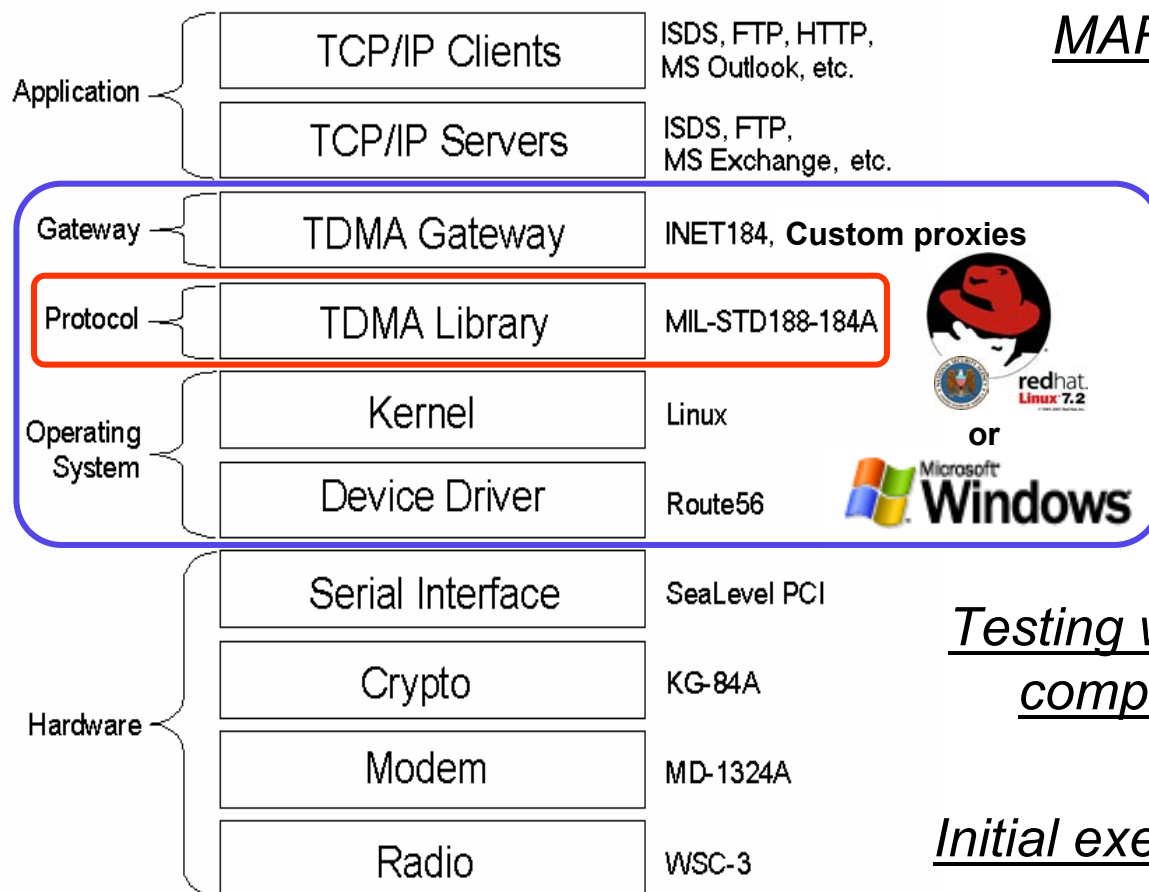
## *Purpose of SkyCAP*

- 5kHz Program MIL-STD interoperability for basic 184
- To provide a reliable way to use ADW in support of IXS transition and demonstrate the benefits of moving towards a new integrated waveform (IW)
- To meet user requests for an easy to use low or no cost method to allow multiple users to pass I/P data across a single UHF SATCOM 5kHz or 25kHz channel and other LOS channels as appropriate
- Provide a Windows software module capable of being used across the full spectrum of Navy/USMC radio systems

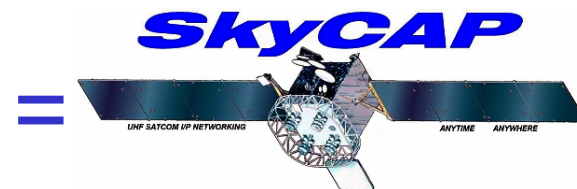


# Software Architecture

## System Layers



Windows development completed  
(DEC 2004) via  
direction/funding from  
MARCORSYSCOM C2PC  
Program

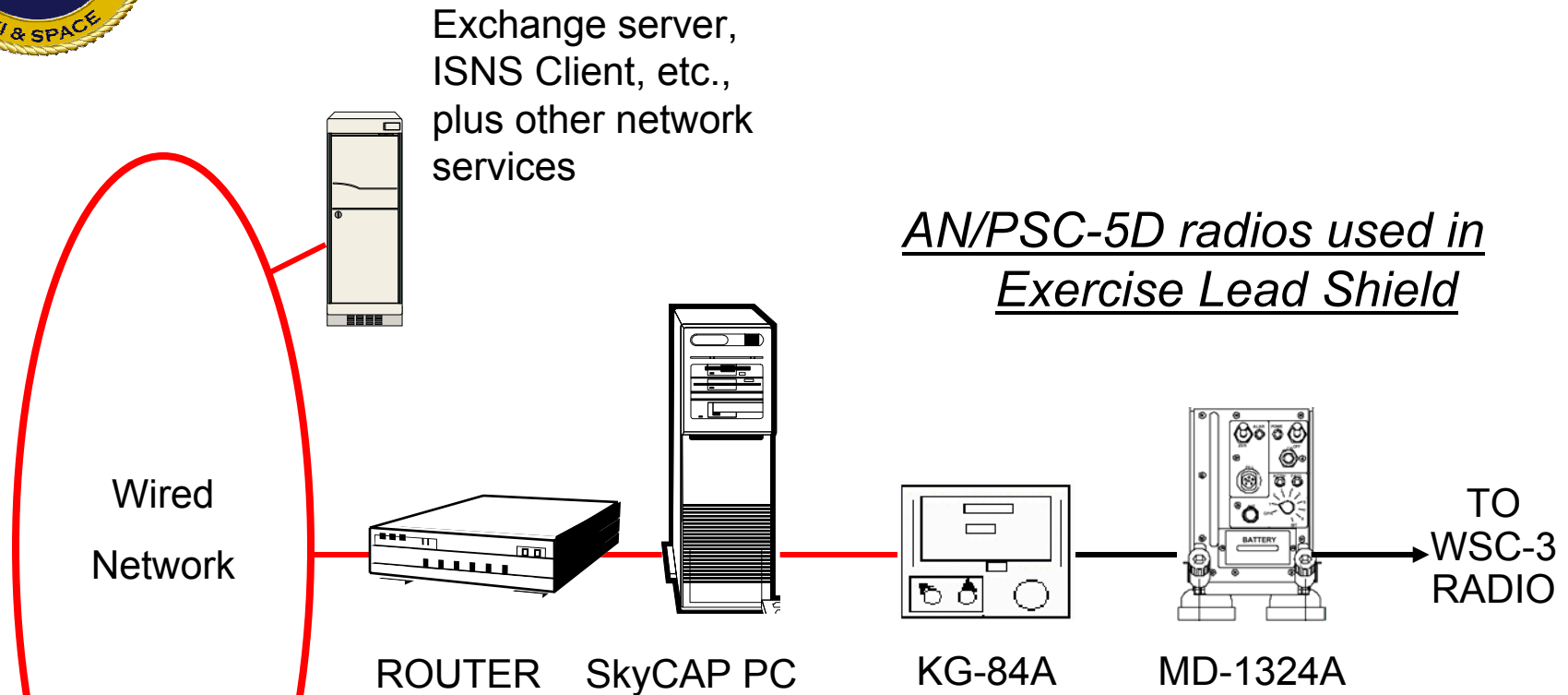


Testing with GCCS-M segments  
completed in MAR/APR 2005

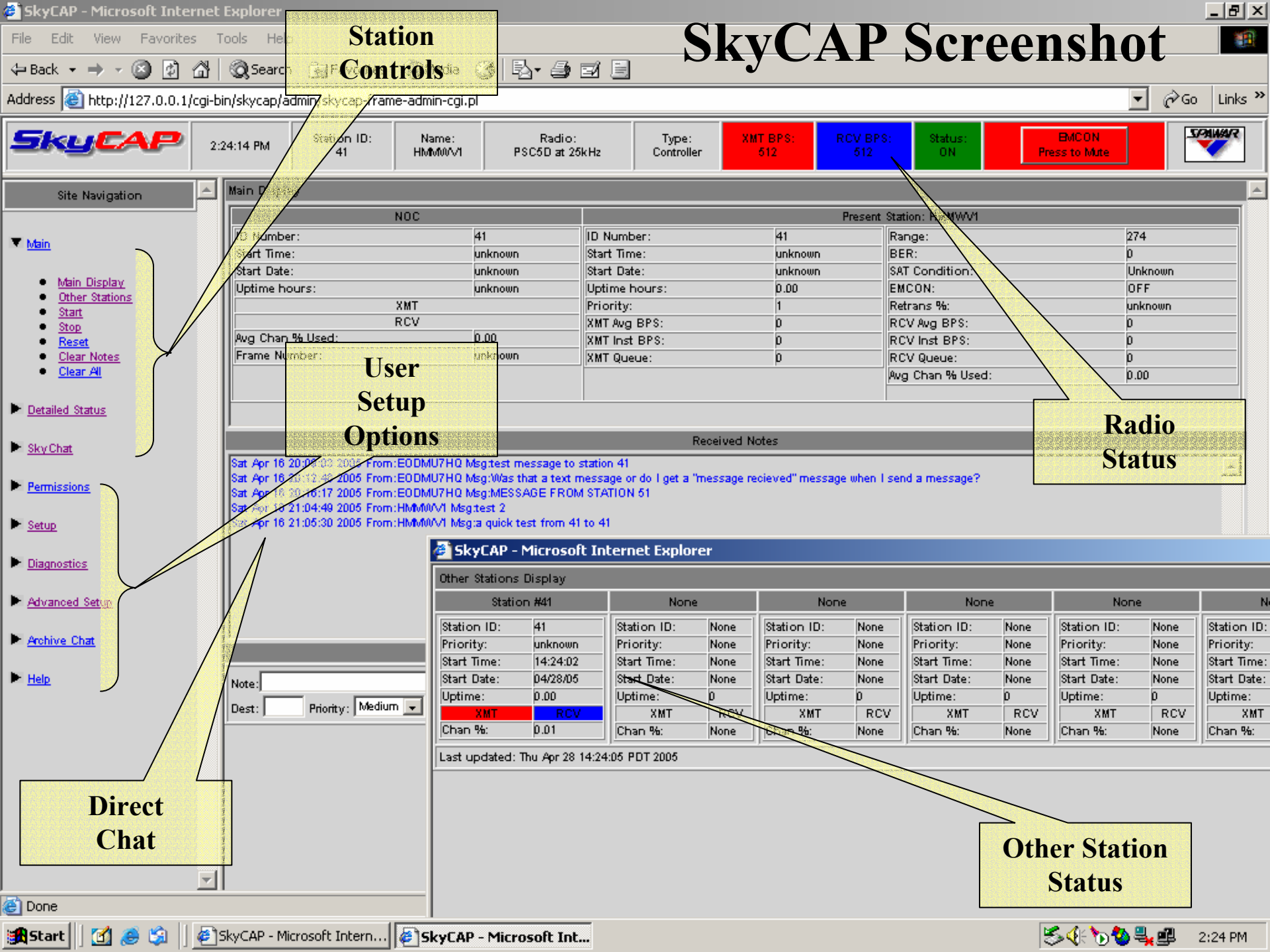
Initial exercise use in Lead Shield  
in MAY 2005



# How It Works



- The SkyCAP PC is assigned an I/P address; tunnels are automatically created for the desired ports; it then functions as a proxy.
- I/P data is stripped down, compressed, and packaged into SkyCAP messages with all FEC applied.
- The networking protocol then transmits the message over the WAN to the distant end where the reverse is performed.







# *Spiral Development Sequence*

- JAN 04
  - Start SkyCAP live SATCOM testing (LINUX version)
- MAR 04
  - Complete SkyCAP JWID build (LINUX version)
- APR 04
  - Complete user test documentation
  - Complete software accreditation for SkyCAP for JWID 2004
- June 04
  - Participated in JWID 2004 demonstration
- DEC 04
  - Complete Windows development
  - Deliver 12 SkyCAP Windows systems to MARCORSYSCOM
- FEB-MAR 05
  - Commence SkyCAP/MEDAL tests with CMWC, NSCT-1 & EOD
- MAY 05
  - SkyCAP/MEDAL in Exercise Lead Shield III

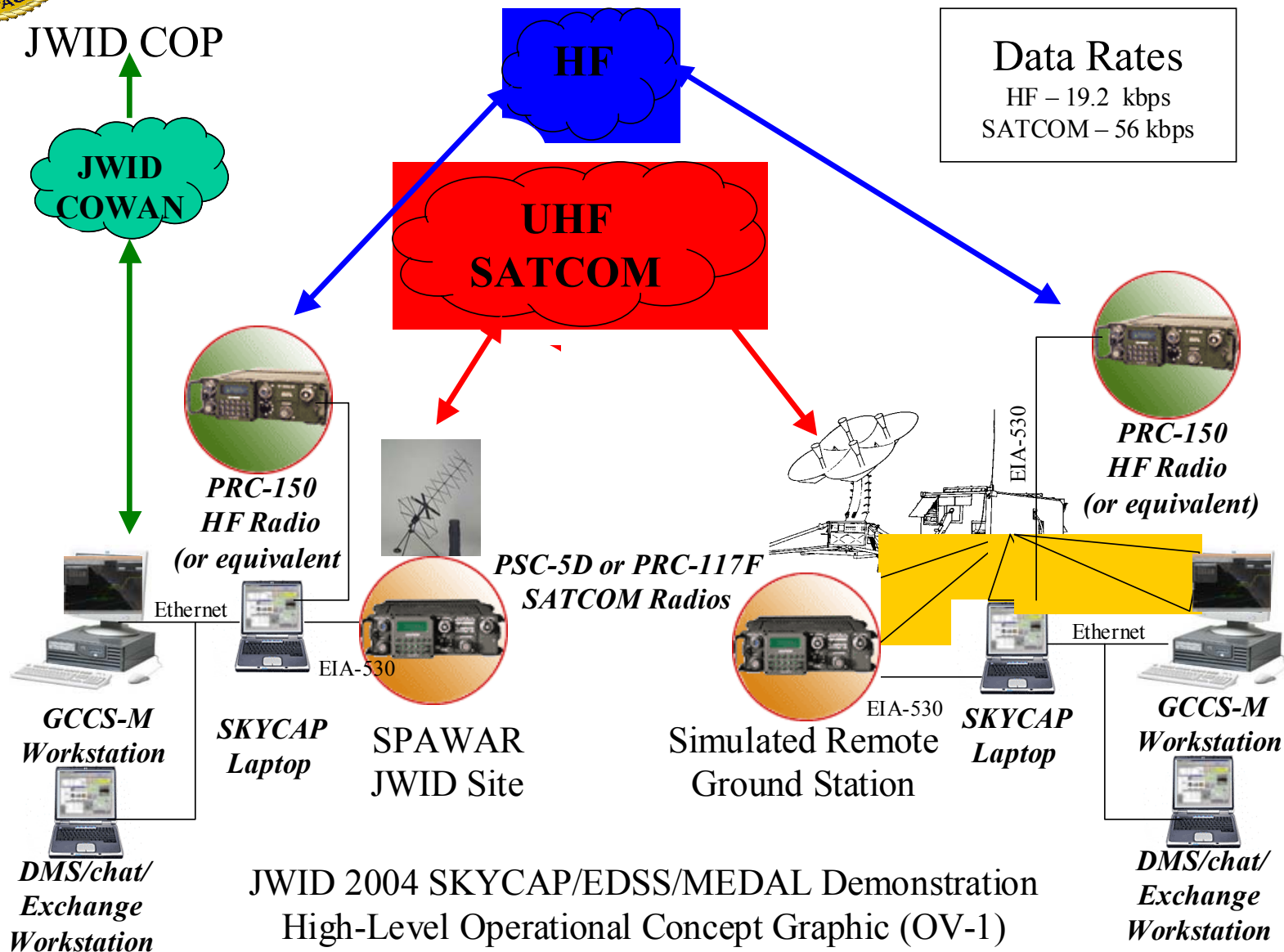


## *Goals of SkyCAP in JWID*

- **Use programmable traffic for scheduled allocation of resources and delivery of timed traffic**
- **Demonstrate reliable single transmission of SMTP and/or X.400/DMS to multiple domains**
- **Demonstrate reliable and timely transfer of FOTC/NETPREC GCCS-M data via SkyCAP**
- **Demonstrate SKYCHAT, a web based chat application**



# *SkyCAP in JWID 2004*





# ***JWID 2004 Results***

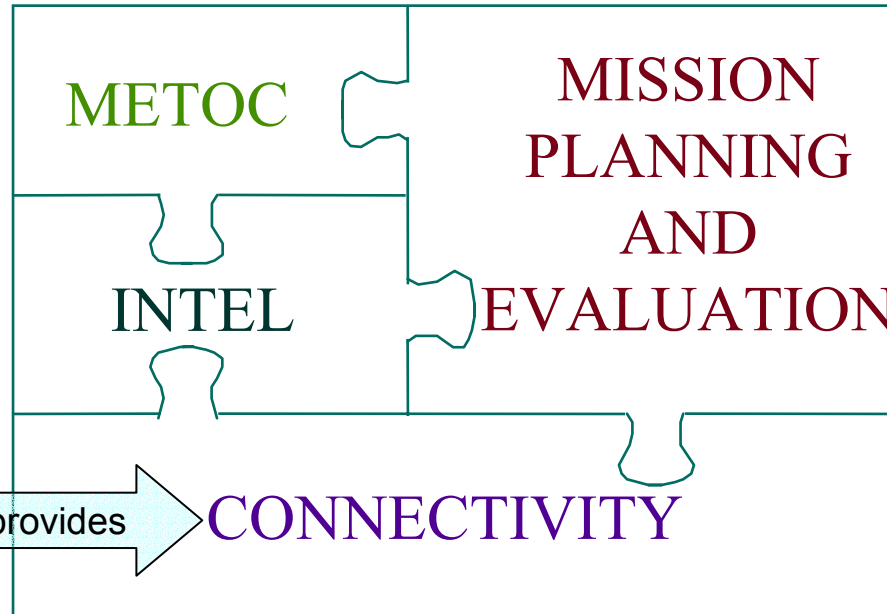
- **Following is quoted from official JWID 2004 final assessment:**
  - The SkyCAP demonstrated significantly improved methods of providing IP connectivity to existing GCCS-M tactical decision aids using current tactical radio systems.
  - The SkyCAP/MEDAL/EDSS combination demonstrated significantly improved methods of providing IP connectivity to existing GCCS-M tactical decision aids using current tactical radio systems.
  - The systems successfully passed the following types of data:
    - Standard GCCS-to-GCCS traffic in the form of USMTF/OTHG text messages via the GCCS NETWORK/NETPREC interfaces to a remote node representing a small tactical field unit. This was accomplished via both standard shipboard (WSC-3) and field manpack (PRC-117F) radio systems.
    - C2PC traffic as an extension of the GCCS track picture from one master Gateway to two remote Gateway/client workstations representing small ships. This was accomplished using standard field HF radio systems.
    - Imagery files (JPEG format was used, although any file type was possible).
    - Chat using Microsoft Chat.
    - Web browsing using standard Internet Explorer



# *What is MEDAL?*

DECISION  
SUPPORT  
SYSTEM

=



=

"A FORCE  
MULTIPLIER"

MEDAL is **THE** Integrated Mission Planning and Evaluation Tool for MIW Forces

COMINEWARCOM 201600Z NOV 96

MEDAL supports:

- MIW Mission Planning.
- MIW Evaluation.
- Command and Control of MIW forces.



# ***MEDAL Testing***

- **Test offer made at initial request of EODMU 7 to test distribution of REMUS platform data via MEDAL from remote mobile teams.**
- **Initial testing 14-15 FEB 05 highlighted configuration and physical problems that required correction.**
- **Follow-on testing 1 MAR 05 at NSCT-1 was successful on both 25 KHz and 5 KHz channels.**
- **Continued MEDAL testing conducted in MAR/APR with EODMU-7 using base stations and mobile HMMWV's.**
- **Use of SkyCAP to support MEDAL data exchange in Exercise Lead Shield III 23-27 MAY 05 via SATCOM and UHF LOS links.**

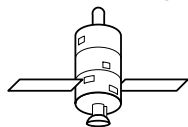


# SkyCAP/MEDAL Test Configuration

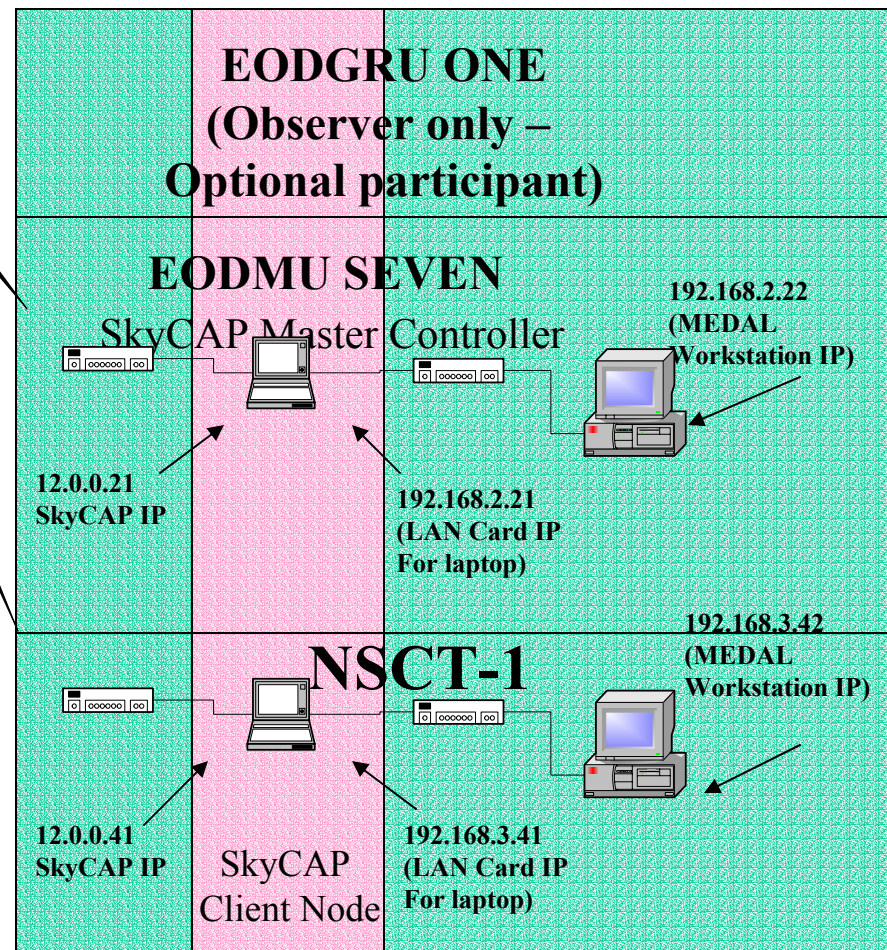
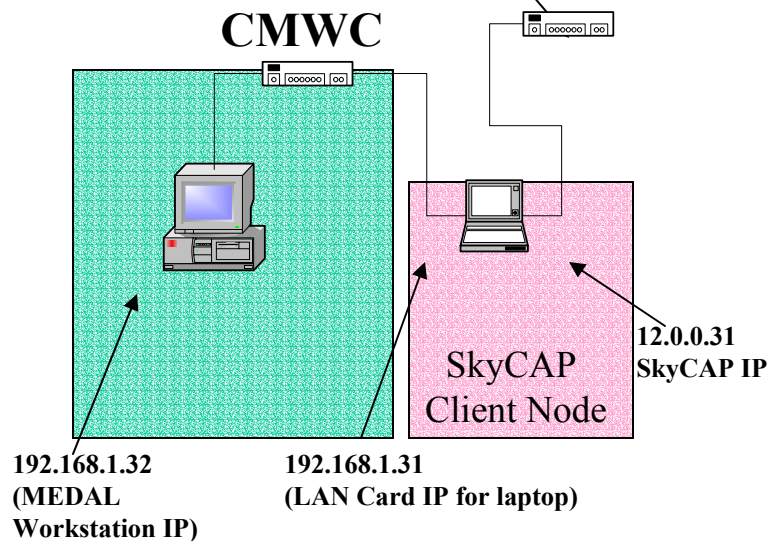
25 KHz Dedicated Channel  
(CONUS channel assigned by JFCOM)

Corpus Christi, TX

San Diego, CA



Radio on loan  
to CMWC from  
NSCT-1



Items provided by  
each command

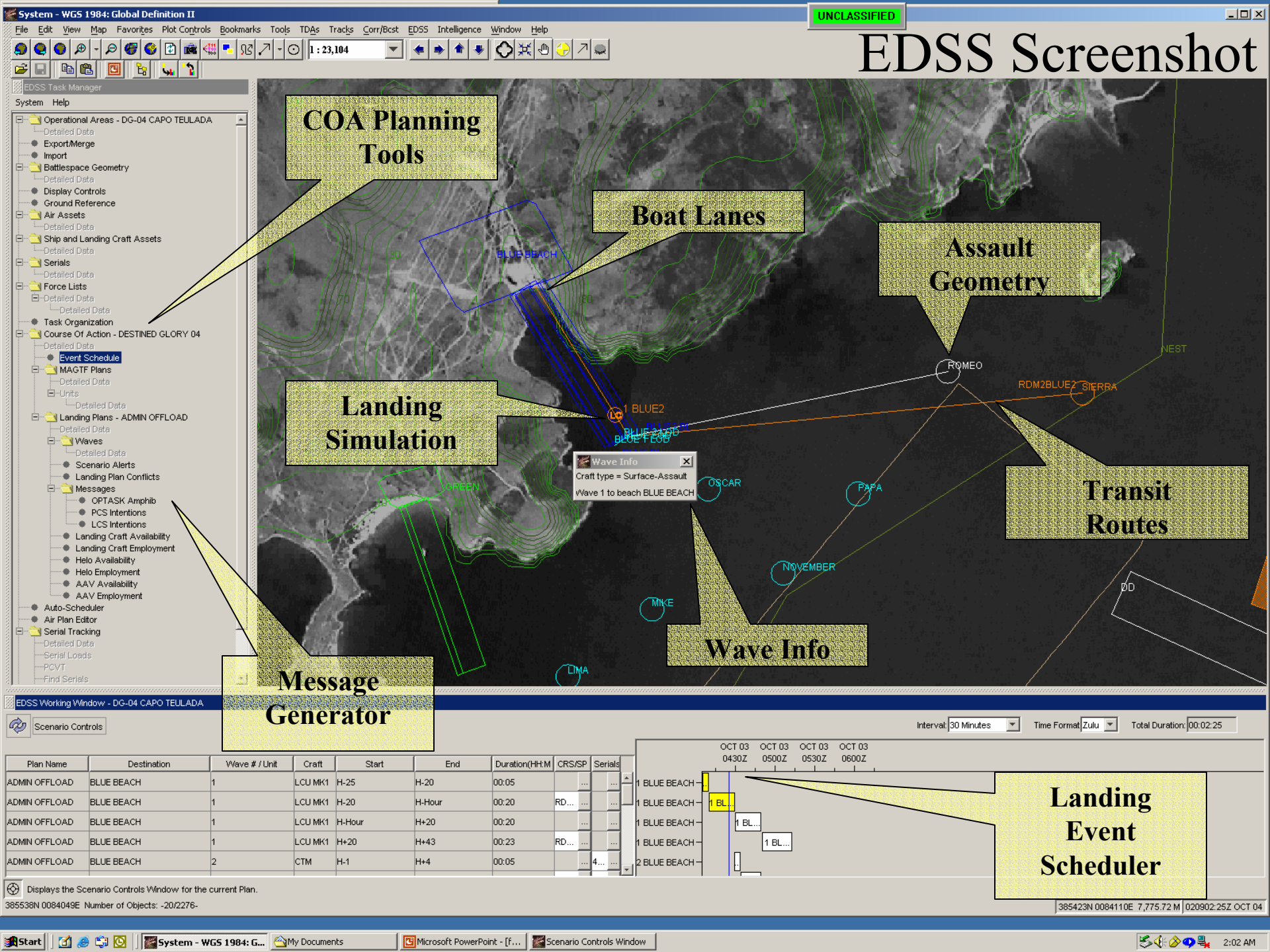
Items provided by  
SPAWAR/ONR



# *What is EDSS?*

- **EDSS is an operational Integrated Mission Planning and Execution Tool supporting Expeditionary Forces**
  - **Set of software Tactical Decision Aids serving all Expeditionary Warfare Commanders ~ Navy & Marine Corps**
  - **ONR sponsored, government owned software**
  - **DII COE compliant software**
    - **US Navy ~ developed as a GCCS-M 4.x segment**
    - **US Marine Corps ~ developed/transitioned as a C2PC v6.1 Injector**
  - **Currently integrated with other Joint/Naval systems (AFATDS, ICODES, MEDAL) and designed to easily interface with additional systems in follow-on spirals (TBMCS, JMPS, etc.)**







# ***MARCORSYSCOM Testing***

- **SkyCAP Windows version tested for MARCORSYSCOM at SPAWAR JICF and MCTSSA (Camp Pendleton) in DEC 04/JAN 05.**
- **Demonstrated reliable data transmission of C2PC and other network data via 25 KHz channel and LOS mode.**
- **Some C2PC data types (Overlays and Opnotes) tended to clog the circuit due to the nature of their transmission**
- **Standard GCCS-M to C2PC track distribution was not affected**
- **Twelve SkyCAP systems delivered to MARCORSYSCOM for continued testing.**
- **EDSS will become an injector of C2PC in Q1FY06**



## *Goals of SkyCAP in Lead Shield*

- **Demonstrate reliable GCCS-M tactical data distribution of MEDAL and other data**
- **Demonstrate SKYCHAT, a web based chat application, for tactical coordination**
- **Demonstrate image file transfers from small mobile units (RHIB, swath boats)**
- **Demonstrate full IP connectivity between supported nodes using UHF SATCOM and LOS**



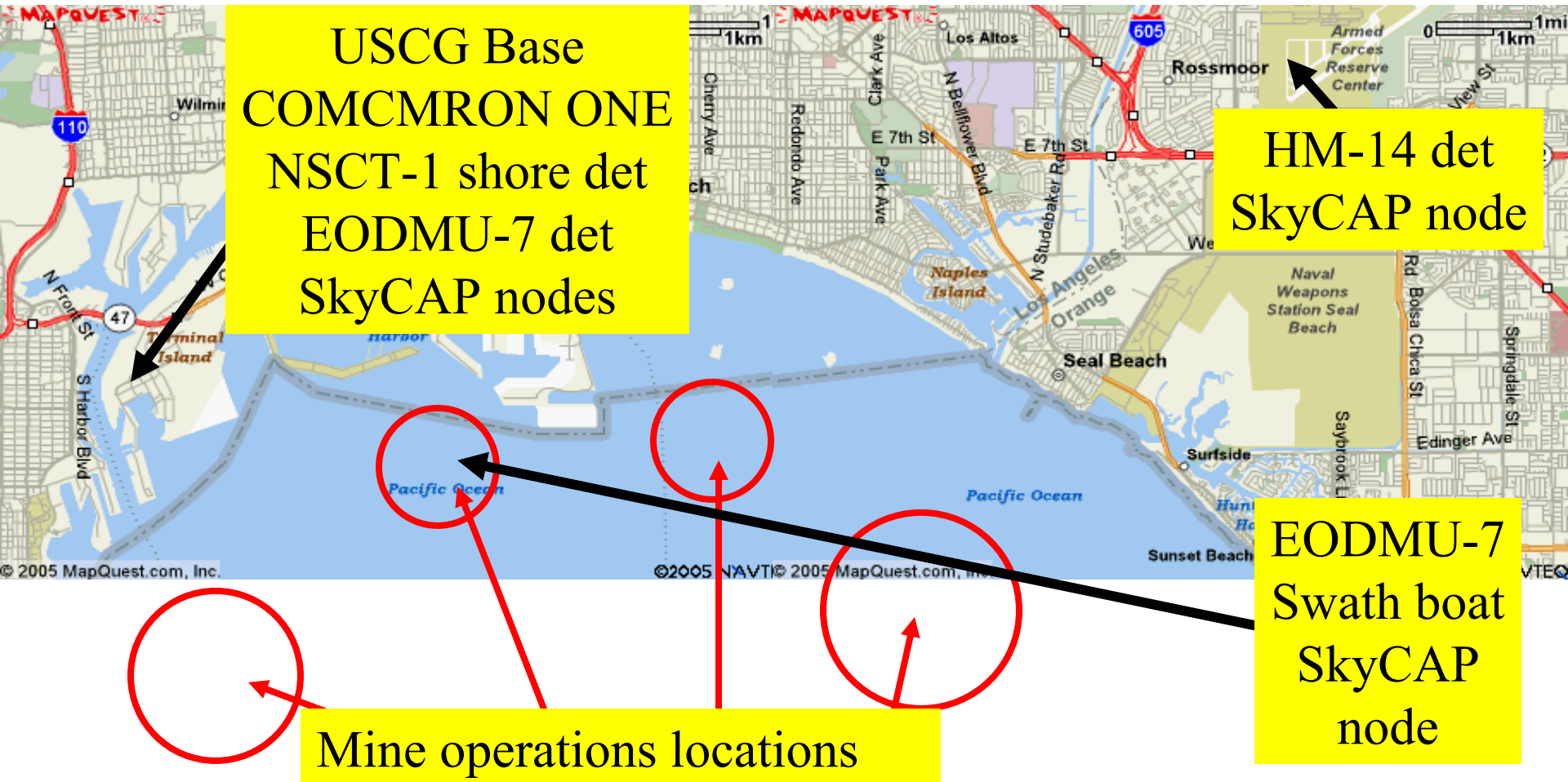
# *SkyCAP Locations in Lead Shield*

USCG Base  
COMCMRON ONE  
NSCT-1 shore det  
EODMU-7 det  
SkyCAP nodes

HM-14 det  
SkyCAP node

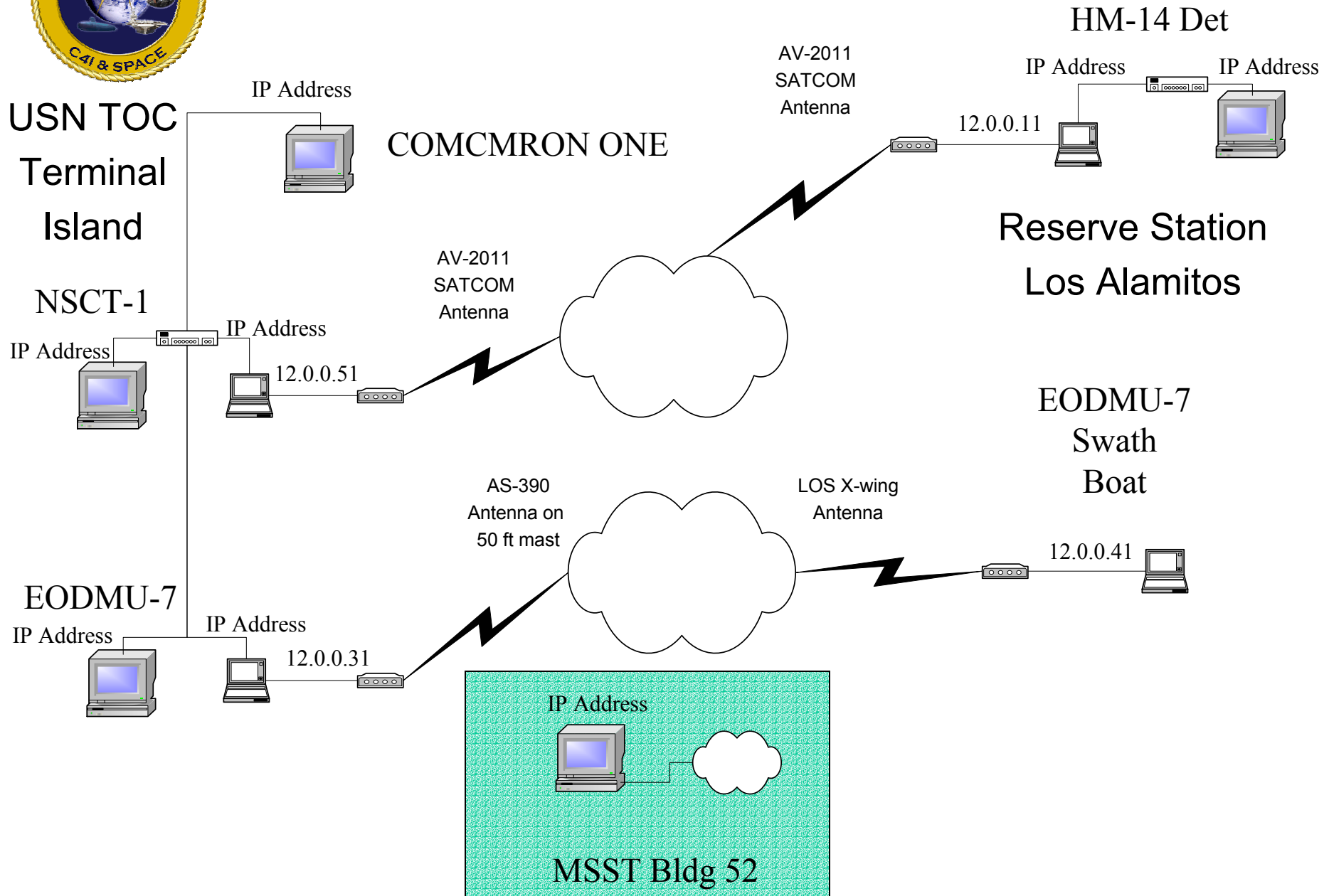
EODMU-7  
Swath boat  
SkyCAP  
node

Mine operations locations





# *SkyCAP Data Architecture for Lead Shield*







# *SkyCAP Lead Shield Configurations*

USN TOC

UHF LOS  
Antenna  
on 50ft  
mast

AV-2011  
SATCOM  
Antenna

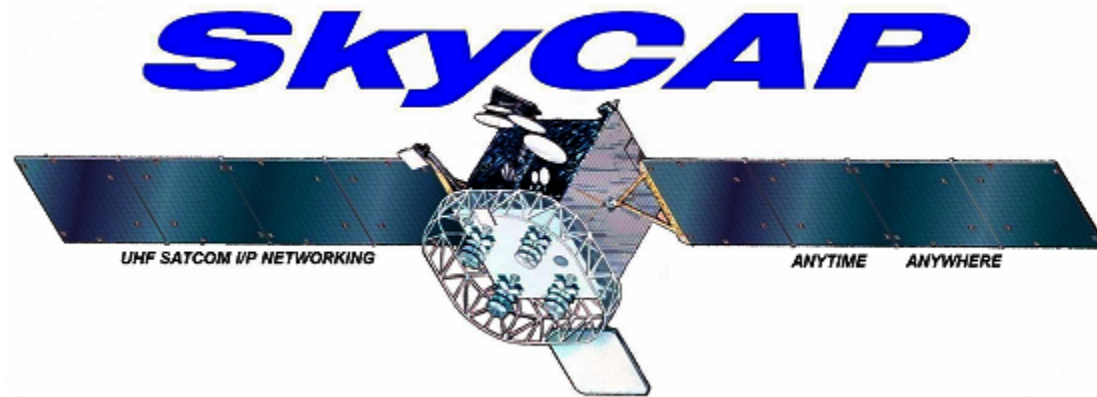
EOD  
Swath boat

HM-14 det



## *What next?*

- **Discussions ongoing for potential use of 25 KHz SATCOM channel to perhaps replace OTCIXS with OTCIXS-IP (SkyCAP).**
- **Additional testing with CMWC and EOD units is scheduled. SkyCAP to participate in October GOMEX with MCM forces.**
- **SkyCAP under consideration as upgrade to MCM vessel communications suite.**
- **SkyCAP to be used with ongoing ONR projects (ARVCOP).**
- **USCG expressing interest in using SkyCAP as airborne IP link to C-130 aircraft.**
- **DOD interest in using SkyCAP for medical IP data exchange from mobile medical units.**



*Questions?*